$\therefore$ $AP=AR$ and $AP.a=AR.a$.

But $AP\sin A=b\sin C$ or $AP.a=bc=AR.a$.

$BP.a=(a-CP)a=a^2-CP.a=a^2-b^2$.

$CR.a=(a-BR)a=a^2-BR.a=a^2-c^2$.

$PR\sin A=AP\sin(\pi-2A)=2AP\sin A\cos A$.

$\therefore$ $PR.a=2AP.a\cos A=2bc\cos A$.

(4) Since $BR.BC=AB^2$, AB touches the circle through ARC at A: therefore one of the Brocard points is on this circumference. Since $CP.CB=CA^2$, CA touches the circle through APB at A, which contains the other Brocard point.

(5) $BR=c^2/a$, $CR'=a^2/b$, $AR''=b^2/c$, $CP=b^2/a$, $BP'=a^2/c$, $AP''=c^2/b$.

$\therefore$ $BR.CR'.AR''=CP.BP'.AP''=abc$; $(B'C')^2=c^2+b^3-2bc\cos 3A=a^2+8bc\cos A\sin^2 A$; $(A'C')^2=b^2+8ac\cos B\sin^2 B$, $(A'B')^2=c^2+8ab\cos C\sin^2 C$.

$$\therefore\ K'-K=8(bc\cos A\sin^2 A+ac\cos B\sin^2 B+ab\cos C\sin^2 C)$$
$$=32\triangle^2(\cos A/bc+\cos B/ac+\cos C/ab)$$
$$=(16\triangle^2/a^2b^2c^2)\Sigma(2a^2b^2-a^4)=256\triangle^4/a^2b^2c^2=16\triangle^2/R^2.$$

181. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.

Prove that the extremities of the latera recta of all ellipses having a given major axis $2a$ lie on the parabola $x^2=-a(y-a)$.

Solution by L. C. WALKER, A. M., Petaluma High School, Petaluma, Cal.; J. R. HITT, Coral Institute, San Marcos, Tex.; and the PROPOSER.

If (x_1, y_1) be an extremity of one of the latera recta, plainly, $y_1=b^2/a$, or $b^2=ay_1$....(1); also, $a^2-b^2=a^2e^2=x_1^2$....(2), b and e having the usual meanings. Eliminating b from (1) and (2), $x_1^2=-a(y_1-a)$.

Also solved by *J. SCHEFFER*, and *G. B. M. ZERR*.

CALCULUS.

137. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, Ohio.

Develop the equation of the curve assumed by the inextensible and revolving skipping rope.

No solution of this problem has been received.

138. Proposed by M. E. GRABER, A. B., Tutor in Mathematics, Heidelberg University, Tiffin, O.

Find the curve the length of whose arc measured from a given point is a mean proportional between the ordinate and twice the abscissa.

Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics in The Temple College, Philadelphia, Pa., and the PROPOSER.

From the problem, $s^2=2xy$ or $s=\sqrt{(2xy)}$.

$$ds=\sqrt{(dx^2+dy^2)}=\frac{1}{\sqrt{2}}[\sqrt{(y/x)}dx+\sqrt{(x/y)}dy] \text{ or}$$